

We claim:

1. A method of reducing lignification in a vascular plant, comprising ectopically expressing a nucleic acid molecule encoding an AGL8-like gene product
5 in said vascular plant, whereby lignification is reduced due to ectopic expression of said nucleic acid molecule.

2. The method of claim 1, wherein said AGL8-like gene product has substantially the amino acid sequence of an AGL8 ortholog.

10 3. The method of claim 2, wherein said AGL8-like gene product has the amino acid sequence of *Arabidopsis* AGL8 (SEQ ID NO:2).

4. The method of claim 1, wherein said vascular plant is a woody plant.

15 5. The method of claim 4, wherein said woody plant is selected from the group consisting of *Eucalyptus*, cottonwood, alder, Douglas fir, Hemlock, pine and spruce.

6. The method of claim 1, wherein said
20 vascular plant is a leguminous plant.

7. The method of claim 6, wherein said leguminous plant is selected from the group consisting of alfalfa, clover, lucerne, birdsfoot trefoil, *Stylosanthes*, *Lotononis bainesii* and sainfoin.

25 8. The method of claim 1, wherein said vascular plant is a forage grass.

9. The method of claim 8, wherein said grass is selected from the group consisting of bahiagrass, bermudagrass, dallisgrass, pangolagrass, big bluestem, indiagrass, switchgrass, smooth brome grass, orchardgrass, timothy, Kentucky bluegrass and tall fescue.

10. The method of claim 1, comprising introducing an exogenous nucleic acid molecule encoding an AGL8-like gene product into said vascular plant to produce a transgenic vascular plant characterized by reduced lignification.

11. The method of claim 10, wherein said exogenous nucleic acid molecule encoding an AGL8-like gene product is operatively linked to an exogenous regulatory element.

12. The method of claim 11, wherein said exogenous regulatory element is a constitutive regulatory element.

13. The method of claim 11, wherein said exogenous regulatory element is a tissue-selective regulatory element.

14. The method of claim 13, wherein said tissue-selective regulatory element is an AGL1 regulatory element or AGL5 regulatory element.

15. The method of claim 13, wherein said tissue-selective regulatory element is a lignified tissue-selective regulatory element selected from the group consisting of a fiber-selective regulatory element, xylem-selective regulatory element and a tracheid selective regulatory element.

16. The method of claim 10, wherein said AGL8-like gene product has substantially the amino acid sequence of an AGL8 ortholog.

17. The method of claim 16, wherein said AGL8-like gene product has the amino acid sequence of *Arabidopsis* AGL8 (SEQ ID NO:2).

18. A method of reducing lignification in a vascular plant, comprising suppressing both AGL1 and AGL5 expression in said vascular plant, whereby lignification is reduced.

19. A transgenic vascular plant characterized by reduced lignification, comprising an ectopically expressed nucleic acid molecule comprising a lignified tissue-selective regulatory element operatively linked to a nucleic acid molecule encoding an AGL8-like gene product.

20. The transgenic vascular plant of claim 19, wherein said AGL8-like gene product has substantially the amino acid sequence of an AGL8 ortholog.

21. The transgenic vascular plant of claim 20, wherein said AGL8-like gene product has the amino acid sequence of *Arabidopsis* AGL8 (SEQ ID NO: 2).

22. The transgenic vascular plant of claim 19, wherein said lignified tissue-selective regulatory element is selected from the group consisting of a fiber-selective regulatory element, xylem-selective regulatory element and a tracheid selective regulatory element.

23. A tissue derived from the transgenic vascular plant of claim 19, said transgenic vascular plant comprising an ectopically expressed nucleic acid molecule comprising a lignified tissue-selective regulatory element operatively linked to a nucleic acid molecule encoding an AGL8-like gene product.

24. A method of enhancing lignification in a vascular plant, comprising ectopically expressing a nucleic acid molecule encoding an AGL1/5-like gene product in said vascular plant, whereby lignification is enhanced due to ectopic expression of said nucleic acid molecule.

25. The method of claim 24, wherein said AGL1/5-like gene product has substantially the amino acid sequence of an AGL1 ortholog.

26. The method of claim 25, wherein said AGL1/5-like gene product has the amino acid sequence of *Arabidopsis* AGL1 (SEQ ID NO:4).

27. The method of claim 24, wherein said AGL1/5-like gene product has substantially the amino acid sequence of an AGL5 ortholog.

28. The method of claim 27, wherein said AGL1/5-like gene product has the amino acid sequence of *Arabidopsis* AGL5 (SEQ ID NO: 6).

29. The method of claim 24, wherein said
5 vascular plant is a woody plant.

30. The method of claim 24, comprising
introducing an exogenous nucleic acid molecule encoding
an AGL1/5-like gene product into said vascular plant to
produce a transgenic vascular plant characterized by
10 enhanced lignification.

31. The method of claim 30, wherein said
exogenous nucleic acid molecule encoding an AGL1/5-like
gene product is operatively linked to an exogenous
regulatory element.

32. The method of claim 31, wherein said
15 exogenous regulatory element is a constitutive regulatory
element.

33. The method of claim 31, wherein said
exogenous regulatory element is a tissue-selective
20 regulatory element.

34. The method of claim 33, wherein said
tissue-selective regulatory element is an *AGL1* regulatory
element or *AGL5* regulatory element.

35. The method of claim 33, wherein said tissue-selective regulatory element is a lignified tissue-selective regulatory element selected from the group consisting of a fiber-selective regulatory element, xylem-selective regulatory element and a tracheid selective regulatory element.

36. The method of claim 30, wherein said AGL1/5-like gene product has substantially the amino acid sequence of an AGL1 ortholog.

37. The method of claim 36, wherein said AGL1/5-like gene product has the amino acid sequence of *Arabidopsis* AGL1 (SEQ ID NO:4).

38. The method of claim 30, wherein said AGL1/5-like gene product has substantially the amino acid sequence of an AGL5 ortholog.

39. The method of claim 38, wherein said AGL1/5-like gene product has the amino acid sequence of *Arabidopsis* AGL5 (SEQ ID NO:6).

40. A method of enhancing lignification in a vascular plant, comprising suppressing AGL8-like gene product expression in said vascular plant, whereby lignification is enhanced.

41. A transgenic vascular plant characterized by enhanced lignification, comprising an ectopically expressed nucleic acid molecule comprising a lignified tissue-selective regulatory element operatively linked to a nucleic acid molecule encoding an AGL1/5-like gene product.

42. The transgenic vascular plant of claim 41, wherein said AGL1/5-like gene product has substantially the amino acid sequence of an AGL1 ortholog.

43. The transgenic vascular plant of claim 42, wherein said AGL1/5-like gene product has the amino acid sequence of *Arabidopsis* AGL1 (SEQ ID NO:4).

44. The transgenic vascular plant of claim 41, wherein said AGL1/5-like gene product has substantially the amino acid sequence of an AGL5 ortholog.

45. The transgenic vascular plant of claim 44, wherein said AGL1/5-like gene product has the amino acid sequence of *Arabidopsis* AGL5 (SEQ ID NO:6).

46. The transgenic vascular plant of claim 41, wherein said lignified tissue-selective regulatory element is selected from the group consisting of a fiber-selective regulatory element, xylem-selective regulatory element and a tracheid selective regulatory element.

47. A tissue derived from the transgenic vascular plant of claim 43, said transgenic vascular plant comprising an ectopically expressed nucleic acid molecule comprising a lignified tissue-selective regulatory element operatively linked to a nucleic acid molecule encoding an AGL1/5-like gene product.

48. A kit for producing a transgenic vascular plant characterized by altered lignification, comprising a nucleic acid molecule comprising a lignified tissue-selective regulatory element and a nucleic acid molecule encoding a gene product selected from the group consisting of an AGL8-like gene product, an AGL1-like gene product and an AGL5-like gene product.

49. The kit of claim 48, wherein said lignified tissue-selective regulatory element is selected from the group consisting of a xylem-selective regulatory element, tracheid-selective regulatory element and fiber-selective regulatory element.

50. A method of enhancing lignification in a vascular plant, comprising ectopically expressing a nucleic acid molecule encoding an R-like bHLH gene product in said vascular plant, whereby lignification is enhanced due to ectopic expression of said nucleic acid molecule.

51. The method of claim 50, wherein said R-like bHLH gene product has substantially the amino acid sequence of an R-like bHLH ortholog.

52. The method of claim 51, wherein said R-like bHLH gene product has the amino acid sequence of SEQ ID NO:25.

53. The method of claim 50, wherein said vascular plant is a woody plant.

54. The method of claim 50, comprising
introducing an exogenous nucleic acid molecule encoding a
R-like bHLH gene product into said vascular plant to
produce a transgenic vascular plant characterized by
5 enhanced lignification.

55. The method of claim 54, wherein said
exogenous nucleic acid molecule encoding a R-like bHLH
gene product is operatively linked to an exogenous
regulatory element.

10 56. The method of claim 55, wherein said
exogenous regulatory element is a constitutive regulatory
element.

57. The method of claim 55, wherein said
exogenous regulatory element is a tissue-selective
15 regulatory element.

58. The method of claim 55, wherein said
R-like bHLH gene product has substantially the amino acid
sequence of an R-like bHLH ortholog.

59. The method of claim 58, wherein said
20 R-like bHLH gene product has the amino acid sequence of
SEQ ID NO:25.

60. A transgenic vascular plant characterized
by enhanced lignification, comprising an ectopically
expressed nucleic acid molecule comprising a heterologous
25 regulatory element operatively linked to a nucleic acid
molecule encoding a R-like bHLH gene product.

61. The transgenic vascular plant of claim 60, wherein said R-like bHLH gene product has substantially the amino acid sequence of a R-like bHLH ortholog.

62. The transgenic vascular plant of claim 61,
5 wherein said R-like bHLH gene product has the amino acid sequence of SEQ ID NO:25.

63. A method of reducing lignification in a vascular plant, comprising suppressing R-like bHLH expression in said vascular plant, whereby lignification
10 is reduced.

64. A non-naturally occurring vascular plant characterized by reduced lignification, in which R-like bHLH expression is suppressed, provided that said vascular plant does not ectopically express AGL8 or have
15 suppressed AGL1 and AGL5 expression.